

AMENDMENTS TO THE CLAIMS

In the claims:

1. (Original) A method of forming a weld joint comprising the steps of:
performing a welding operation along a weld line to form a weld joint and heated regions along the surfaces of the workpieces; and
performing a compression operation to induce a deep layer of compression in the surfaces of the workpieces;
wherein the welding operation forms regions having an elevated surface temperature; and
wherein the compression operation is performed along the weld line and regions having an elevated surface temperature.
2. (Original) The method of claim 1 wherein the amount of surface cold working is less than about 2 percent.
3. (Original) The method of claim 1 wherein the amount of surface cold working is less than about 5 percent.
4. (Original) The method of claim 1 wherein inducing a deep layer of compression is performed using a burnishing process.

5. (Original) The method of claim 1 further comprising the step of passing a single-point compression tool in a predetermined pattern across the weld line to induce a desired compressive stress pattern having a selected amount of cold working and surface hardening.
6. (Original) The method of claim 1 wherein the welding operation and the compression operation are performed in a single pass.
7. (Currently Amended) The method of claim 1 further comprising the step of varying the amount of surface cold working to achieve a desired residual compressive stress pattern.
8. (Original) The method of claim 1 further comprising the step of cooling a region along the surface of at least one workpiece prior to performing the compression operation.
9. (Original) The method of claim 1 further comprising the step of creating a surface temperature gradient within a region of a workpiece and performing the compression operation along the region.

- 10. (Original)** A method of forming a weld joint comprising the steps of:
- positioning at least two workpieces together forming a weld line;
 - performing a welding operation along the weld line to form a weld joint;
 - creating a surface temperature gradient within regions of the workpieces; and
 - performing a compression operation to induce a layer of residual compressive stress along the regions.
- 11. (Original)** The method of claim 10 wherein the regions are heated to elevated temperatures.
- 12. (Original)** The method of claim 10 wherein the regions are cooled to lower temperatures.
- 13. (Original)** The method of claim 10 wherein the amount of cold working of the surface of the workpieces is less than about 5 percent.
- 14. (Original)** The method of claim 10 wherein the amount of cold working of the surface of the workpieces is less than about 2 percent.

15. (Original) The method of claim 10, wherein the pattern of burnishing is controlled to induce a selected residual stress pattern along the surfaces of the workpieces.

16. (Original) The method of claim 10 wherein the welding operation and the compression operation are performed in a single pass.

17. (Currently Amended) An apparatus for forming a weld joint, the apparatus comprising:

means for performing a welding operation to weld at least two workpieces together; and

means for inducing a deep layer of compression within the surface of the workpieces;

means for creating a surface temperature gradient within regions of the workpieces; and

wherein said means for performing the welding operation is selected from the group consisting of gas welding, arc welding, resistance welding, thermite welding, laser welding, and electron-beam welding.

18. (Canceled)

19. (Original) The apparatus of claim 17 wherein said means for inducing a deep layer of compression within the surface of the weld joint comprises a burnishing device.

20. (Original) The apparatus of claim 17 further comprising a controller for automatically controlling the movement of said welding tool and the compression tool.

21. (Original) The apparatus of claim 17 further comprising means for depositing a coolant along the surfaces of the workpieces.

22. (Original) The apparatus of claim 17 further comprising means for heating selected regions of the surfaces of the workpieces.